RENAULT

# Technical Note 6015A

**All types**

**Sub-sections concerned: 88A - 88B - 88C**

# ELECTRICAL WIRING REPAIR

***This note cancels and replaces Technical Notes 8074 and 8075***

**77 11 332 302** **September 2005** **EDITION ANGLAISE**

"The repair procedures given by the Manufacturer in this document are based on the technical specifications current when it was prepared.

The procedures may be modified as a result of changes introduced by the manufacturer in the production of the various component units and accessories from which his vehicles are constructed."

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# ELECTRICAL WIRING REPAIR

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**IMPORTANT**
**This note authorises the repair of electrical wiring in very specific cases only and under certain conditions.**
**Check that the repair in question is authorised and that the repair conditions are respected.**

**1 - Result of the fault finding procedure.**

Note:
During repair, check that you have the most recently updated version of the Technical Note.

A preliminary fault finding procedure has enabled a wiring fault to be identified. Follow the investigation procedure below.

Disconnect the battery (see the **MR corresponding to the vehicle, 80A, Battery, Battery: Removal - Refitting**).

Remove the components necessary to access the area to be worked on. The operation area must allow the pliers and the heat gun to be used, without blocking visibility.

**IMPORTANT**
**If the damaged section is not sufficiently accessible, remove the wiring concerned and repair on the bench.**

When the damaged section is sufficiently accessible, detach the wires to be repaired from the main wiring.

**IMPORTANT**
**Check if there is a sensitive line. These cases are listed in the specific procedures reference table in this section.**
**If there is a sensitive line, replace the defective wiring or apply the specific procedure, if one exists. These procedures are indicated in the specific procedures reference table in this section.**

Check that the fault is located more than 10 cm from the connector.

**NOTE**
**If the damaged section is located less than 10 cm from the connector, replace the defective wiring, unless a wiring-connector kit (connector with wires) exists. In this case, use the kit to replace the damaged section and the connector.**

**This note does not authorise operations directly on the connectors and electrical contacts**. Only wiring-connector kits allow the replacement of a connector. These kits can have associated procedures.

Note:
To check whether there is a wiring-connector kit, consult DIALOGYS. These kits are generally linked to specific wiring or function diagrams.

Note:
If the fault is located at the electrical contact (in the connector) and if it is linked to a corrosion or heating fault, replace the wiring or fit the wiring-connector kit. Also check the connector complement.

Note:
In all cases, pay particular attention to supply and earth lines and their tightening (refer to the tightening torques in the MRs concerned).

After having carried out the checks (outlined in the **Summary flowchart of the investigation procedure**), if the repair is authorised, and it does not require a specific procedure, carry out the generic procedure (see **88A, Wiring, Wiring: Repair**).

Note:
If you have been referred to this note by an MR, Technical Note or removal-refitting procedure, apply the repair procedure adapted to the case in question. Either the generic repair procedure (see **88A, Wiring, Wiring: Repair**), or a specific procedure listed in the specific procedures reference table in this section.

**2 - Specific procedures reference table.**

● **Guidelines for reading the tables below:**

– If not otherwise stated, consider all components or electrical connections which have a connection to the functions or equipment listed. For example: For the electric power assisted steering, the function is not specified. It is prohibited to carry out operations on any wire attached to the electric power assisted steering.

– The recommendations for the specific cases take precedence over the general cases. For example: For an operation on a pair of twisted wires (general case) for the airbag function (specific case), the specific case refers back to the repair procedure for Airbags and pretensioners, and the general cases refer back to the repair procedure for multiplex lines. It is the specific cases which take precedence; follow the referral to the repair procedure for Airbags and pretensioners.

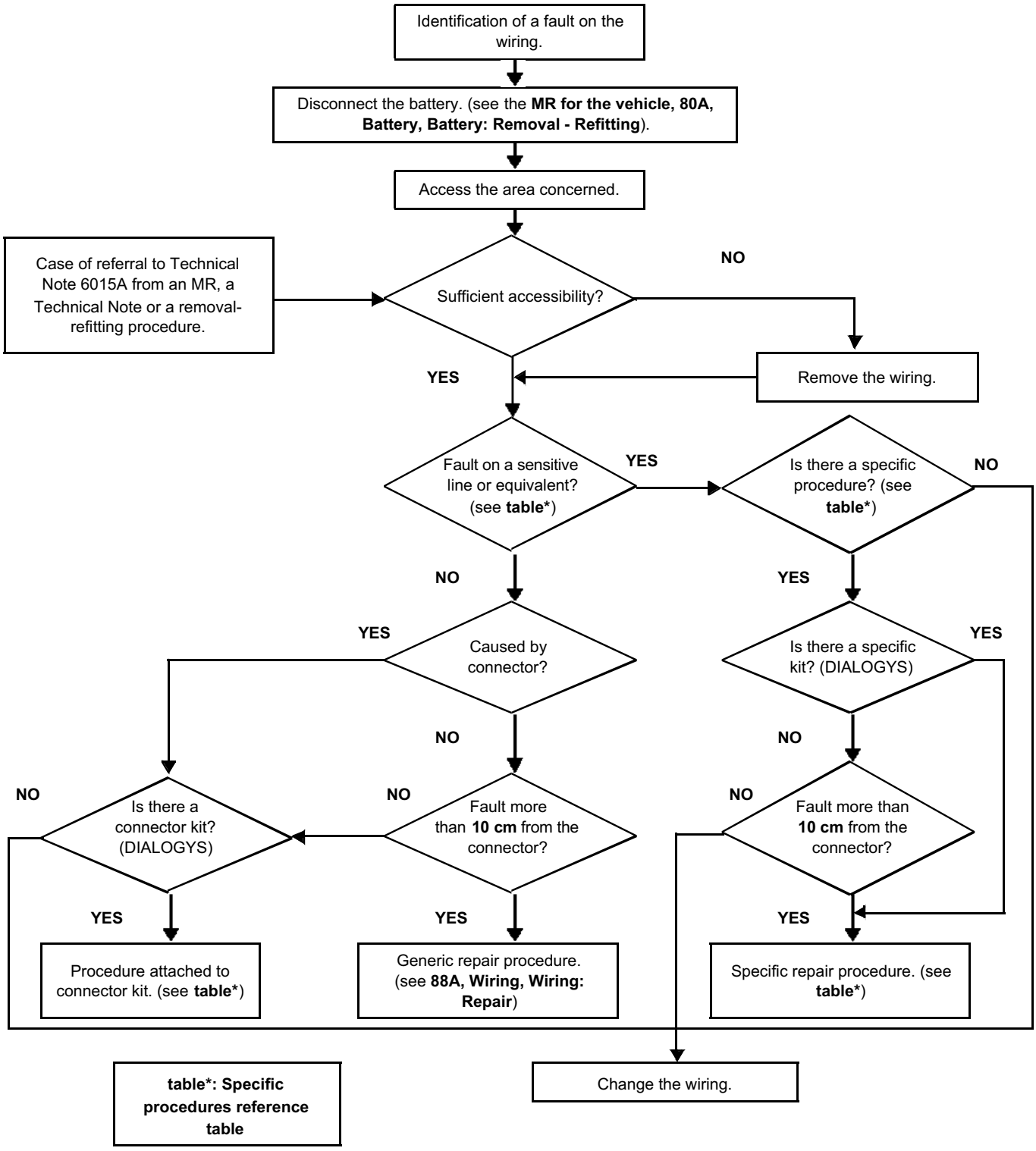
● **Specific cases:**

| Functions or components | Details | Instructions |
|---|---|---|
| Diesel or petrol engine and transmission assembly | Pedal potentiometer | Change the wiring |
| | Cylinder sensor | Change the wiring |
| | TDC sensor | **See OTS** |
| | Rail pressure regulator | Change the wiring |
| | Fuel flow actuator on the pump | Change the wiring |
| | Injectors | Change the wiring |
| | Throttle valve connections | Change the wiring |
| | Coils | Change the wiring |
| Multiplex network | CAN | (see **88B, Multiplex, Multiplex network: Repair**) |
| Airbags and pretensioner | Under seat connector | (see **88C, Airbags and Pretensioners, Airbag and Pretensioner Wiring: Repair**) |
| | Airbag detonator (squib) connector | (see **88C, Airbags and Pretensioners, Airbag and Pretensioner Wiring: Repair**) |
| | Pretensioner (squib) connector | (see **88C, Airbags and Pretensioners, Airbag and Pretensioner Wiring: Repair**) |
| | Airbag computer connector | (see **88C, Airbags and Pretensioners, Airbag and Pretensioner Wiring: Repair**) |
| | Airbag sensor | Change the wiring |
| | Other airbag lines | (see **88C, Airbags and Pretensioners, Airbag and Pretensioner Wiring: Repair**) |
| ABS | ABS sensor | Change the wiring |
| | Other ABS lines | Change the wiring |
| EPAS | / | Change the wiring |

● **General cases:**

| Functions or components | Details | Instructions |
|---|---|---|
| Wiring harness | Number of damaged wires 10 or fewer | (see **88A, Wiring, Wiring: Repair**) |
| | Number of damaged wires more than 10 | Change the wiring |
| Equipment and predispositions specific to commercial vehicles and conversions | / | Change the wiring |
| Connections or associated components | / | (see **88A, Wiring, Connector: Repair**) |
| Splices | Splice with more than 3 wires | Change the wiring |
| | 3-wire splice which does not need sealing | (see **88A, Wiring, Wiring: Repair**) |
| | Splice with 3 wires or more, which needs sealing (engine and underbody areas and damp areas of the doors and boot) | Change the wiring |
| Wires outside the loom | Sheathed wires | Change the wiring |
| | Shielded wires | Change the wiring |
| | Twisted wires | **if the wire cross-sections are 0.5 $mm^2$:** (see **88B, Multiplex, Multiplex network: Repair**) |
| | Flat cable | Change the wiring |
| | Wires with specific thermal protection | Change the wiring |
| | Wires with copper cross-section less than 0.35 $mm^2$ | Change the wiring |
| | Wires with copper cross-section greater than 6 $mm^2$ | Change the wiring |
| | Wires damaged less than 10 cm from the connector | (see **88A, Wiring, Connector: Repair**) |

**3 - Summary flowchart of the investigation procedure defined in this section.**


Identification of a fault on the wiring.
Disconnect the battery. (see the **MR for the vehicle, 80A, Battery, Battery: Removal - Refitting**).
Access the area concerned.
Case of referral to Technical Note 6015A from an MR, a Technical Note or a removal-refitting procedure.
Sufficient accessibility?
NO
Remove the wiring.
YES
Fault on a sensitive line or equivalent? (see **table***)
YES
Is there a specific procedure? (see **table***)
NO
NO
YES
Caused by connector?
YES
Is there a specific kit? (DIALOGYS)
YES
NO
NO
Is there a connector kit? (DIALOGYS)
NO
Fault more than **10 cm** from the connector?
NO
Fault more than **10 cm** from the connector?
YES
YES
YES
Procedure attached to connector kit. (see **table***)
Generic repair procedure. (see **88A, Wiring, Wiring: Repair**)
Specific repair procedure. (see **table***)
Change the wiring.
**table*: Specific procedures reference table**

**1 - Purpose and applications.**

Description of the content of the Wiring repair kit case as well as the procedure and the field of application.

The kit enables wiring which is damaged or has cut electrical wires to be repaired while retaining its operating characteristics.

It also allows wiring-connector kits to be used.

All electrical cables and wires with cross-sections between **0.35 $mm^2$** and **6 $mm^2$**, except sensitive lines (defined in this document), are affected.

**IMPORTANT**
**Repair of sensitive lines is prohibited using the generic procedure alone. This repair can be authorised on condition that it is complemented with a suitable procedure** (see **88A, Wiring, Wiring: Precautions for repair**).

The technical nature and the sensitivity of this type of operation requires the adapted equipment contained and described in the Wiring repair kit case.

**NOTE**
**Using tools or components which have not been recommended is strictly forbidden when repairing wiring.**

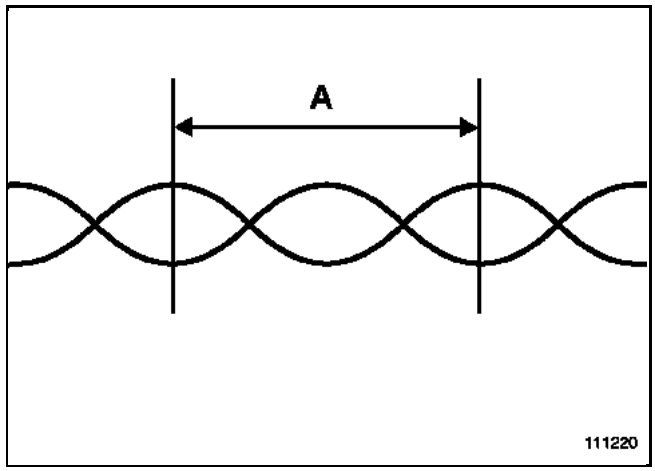
**IMPORTANT**
**For sensitive lines, only automotive electricians, technician agents or cotechs (Level 2 Electricity as a minimum) can carry out the repair described in this note.**

**2 - Terminology.**

● **Wiring-connector kit.**
Kit usually made up of a connector, the cells of which are fitted with crimped wires along with sleeves for joining.

● **Multiplex lines or connections.**
Principal or secondary CAN network lines linking the computers together and made up of twisted pairs of stranded wires.

● **Turns or twists.**
For twisted pairs:
One turn (twist) = (**A**)



**1 - Case and label.**

● **Case (77 11 229 893).**

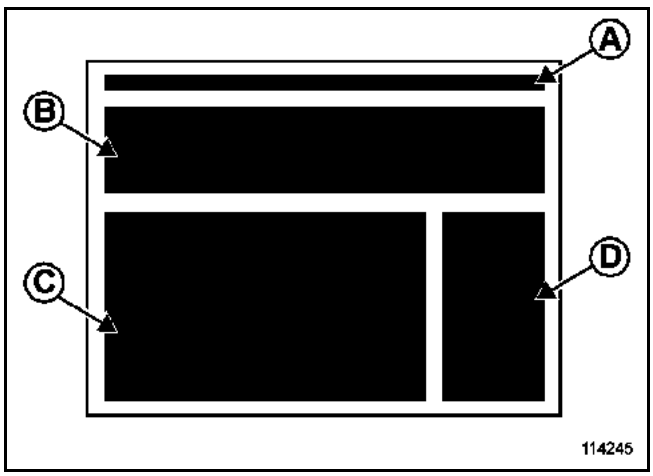
The case contains all the components described in this section. A label lists their part numbers.

● **Label.**

The label affixed inside the case is made up of 4 sections printed in English and French.

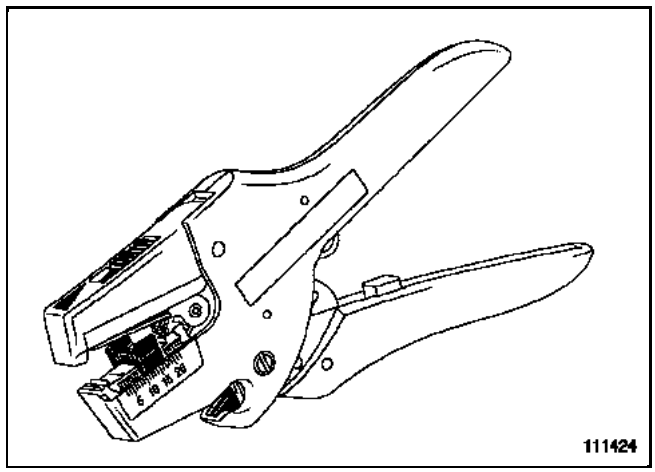
In the upper section, at (**A**) is the title and number of the note. In (**B**) are the After-Sales part numbers (for the network) and MABEC code (for factories) which enables the kit to be restocked with consumables or new tools or a new kit to be ordered.

In the lower section (**C**) is a table (not exhaustive) which helps in selecting the correct sleeve, with a summary of the recommendations for each case. And in (**D**) are the recommendations for use.




**2 - Tools.**

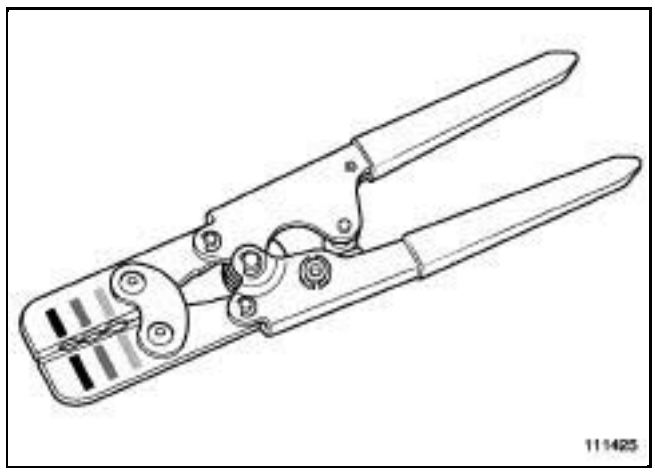
● **Stripping pliers (77 11 230 416).**




These are automatic pliers which enable an electrical conductor up to a maximum cross-section of **6 mm$^2$** to be cut or stripped.
The length of the stripped section can be adjusted up to **20 mm**.

The operating instructions for this kit are described in this document (see **88A, Wiring, Wiring repair kit: Use**).

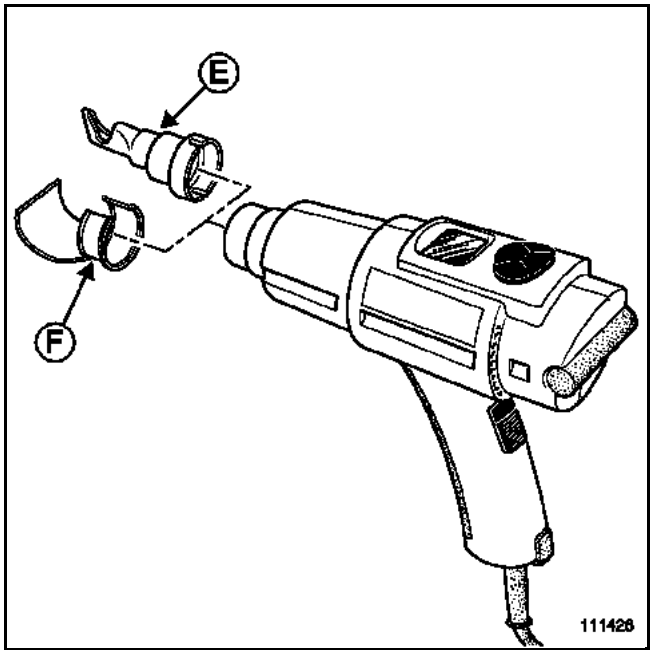
● **Crimping pliers (77 11 230 417).**




The crimping pliers have three sizes of jaw (red, blue and yellow) which correspond to the crimp sleeves. These pliers are recommended for the crimping the sleeves provided in the kit.

The operating instructions for this kit are described in this document (see **88A, Wiring, Wiring repair kit: Use**).

● **Heat gun (77 11 230 415).**



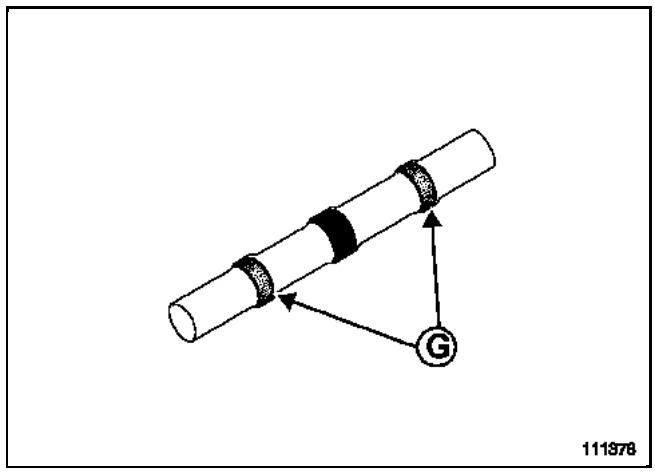

The heat gun is a hot air blower with 2 nozzles which enable it to be adapted for different needs:
- Concentrator nozzle **(E), (77 11 237 778)**.
- Heat shield nozzle **(F), (77 11 237 777)**.

It can be used to solder all self-solder sleeves and to contract the heat-shrinkable parts and sheaths on all sleeves.
Its temperature and flow of air are adjustable and are indicated on the screen.
Temperature adjustment from **80°C** to **650°C** by increments of **5°C**.
Air flow adjustment from **200 l/min** to **550 l/min** at 5 levels displayed on the screen.

The operating instructions for this kit are described in this document (see **88A, Wiring, Wiring repair kit: Use**).

**3 - Consumables.**

● **Self-soldering sleeves.**



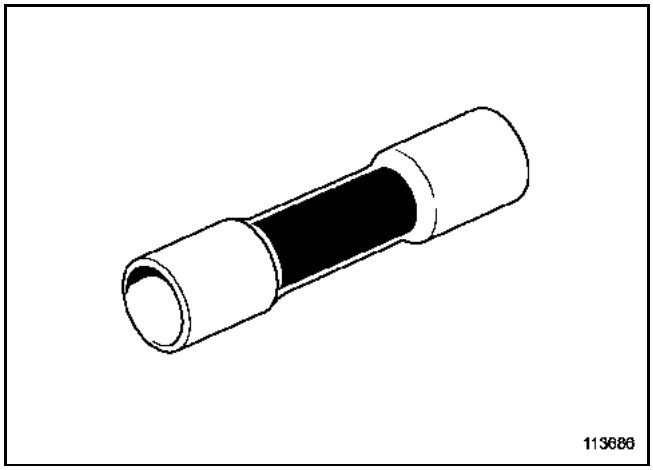

There are three sizes of heat shrinkable self-solder sleeve differentiated by the colour of their rings (**G**):

- **Clear**, for a copper cross-section (sum of 2 wires) between **0.3** and **0.8 mm$^2$** in total.
- **Red**, for a copper cross-section (sum of 2 wires) between **0.8** and **2.0 mm$^2$** in total.
- **Blue**, for a copper cross-section (sum of 2 wires) between **2.0** and **4.0 mm$^2$** in total.

These are sealing sleeves. The seal is formed by the rings which tighten around the wire when heated.

These sleeves are only to be used for connecting one wire with another wire (1-to-1).

● **Crimping sleeve.**




There are three sizes of heat shrinkable crimp sleeve differentiated by the colour of their rings:

– **Red**, for a copper cross-section between **0.5** and **1.5 mm$^2$**.

– **Blue**, for a copper cross-section between **1.5** and **2.5 mm$^2$**.

– **Yellow**, for a copper cross-section between **3.0** and **6.0 mm$^2$**.

These are sealing sleeves. The seal is formed by the inner wall which becomes adhesive when heated.

These sleeves can be used to join one wire with another wire (1-to-1) or two wires with another wire (2-to-1).

In the case where two wires are joined to one wire (2-to-1), the seal is no longer guaranteed. Do not use when a seal is required.

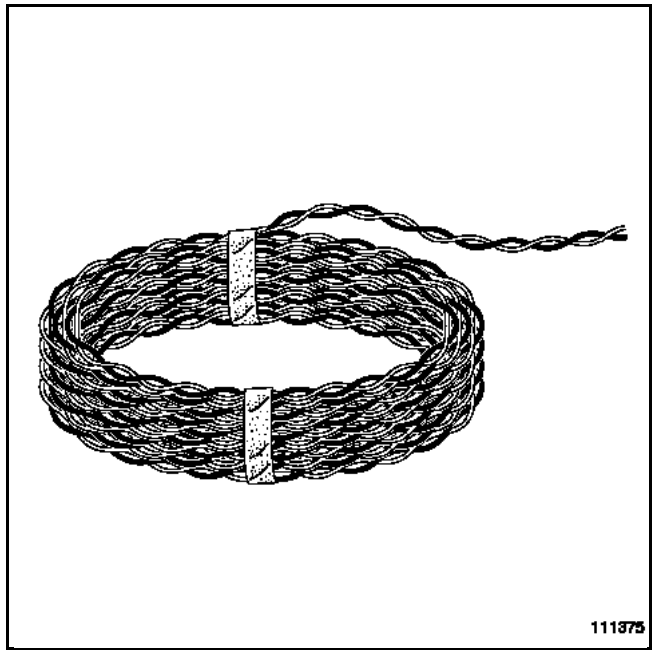
● **Heat shield.**

The heat shield screen is a **250 mm** by **250 mm** square. It is intended to protect the surrounding area from the flow of hot air from the heat gun.

● **Adhesive PVC tape.**

Use the adhesive PVC tape for taping the wires. Do not use it to protect or insulate electrical parts.
It is a contact-adhesive high temperature tape.

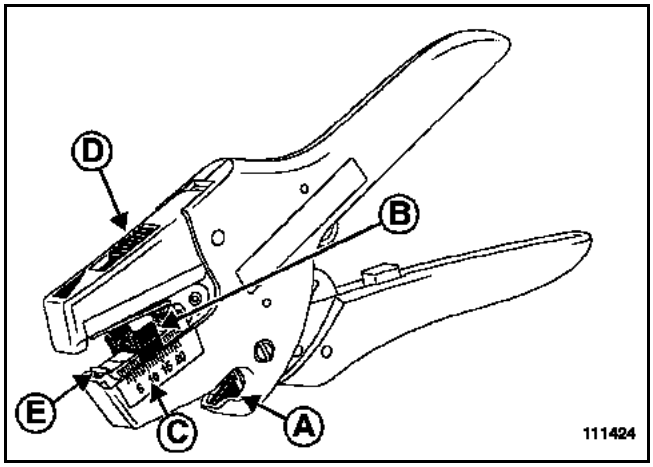
● **Coil of twisted wires.**




This is a coil of a twisted pair of wires (40 turns/ linear m). Ensure these wires remain twisted.
The 2 wires have a **0.5 mm$^2$** cross-section and are of temperature class T3. It is possible to fit them in all areas of the vehicle during repairs to twisted wires of the same cross-section.

Note:
This section is an abridged version of the instructions for use of the tools in the kit.

**1 - Stripping pliers.**




● **Description of the stripping pliers:**

(**A**) = Wire cutter.
(**B**) = Stop for adjusting the length to be stripped.
(**C**) = Scale (millimetre divisions).
(**D**) = Pressure adjustment.
(**E**) = Stripping jaws and cutting edges.

● **Cutting a wire:**

To cut electrical wires up to **6 mm$^2$**, insert the wire into slot (**A**) and press the handle.

● **Stripping a wire:**

This pair of stripping pliers is automatic. It does not need adjusting to the cross-section of wire to be stripped (**6 mm$^2$** maximum).

To strip a wire, adjust the length to be stripped by moving the stop (**B**). Press lightly on the ends to make it slide. The length to be stripped is read on the scale (**C**) in millimetres (mm).

Adjust the stripping pressure by moving the cursor (**D**). Press on the cursor to make it slide. The further forward the cursor is, the greater the force.

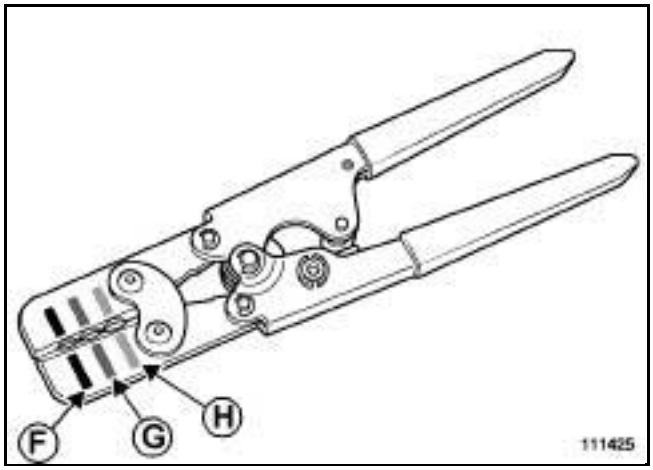
**NOTE**
**If the pressure is too weak, the cutting edges will not grip the wire's insulation. If the pressure is too strong, the cutting edges can cut through the copper strands. Start with a medium setting and then adjust according to results.**

Place the end of the wire against the stop (**B**) and bring it out through the jaws (**E**).

Press the handle. The jaws will grip the wire. The cutting edges will automatically adjust their position in relation to the section of wire and strip it.

**NOTE**
**Check the quality of the stripped wire (insulation cleanly removed and no cut copper strands). Start again if necessary.**

**2 - Crimping pliers.**




The crimping pliers are the only pliers recommended for crimping the crimp sleeves in the kit.

They are used on the 3 sizes of crimp sleeve:
- At (**F**) for crimping the **red** crimp sleeve.
- At (**G**) for crimping the **blue** crimp sleeve.
- At (**H**) for crimping the **yellow** crimp sleeve.

Before crimping a sleeve:
- choose the sleeve appropriate to the cross-section of the wire (see **88A, Wiring, Wiring: Repair**),
- strip the recommended length of wire.

● **Crimping operation:**

Squeeze the handles fully together to unlock the pliers and open the jaws.

On the pliers, find the crimping jaws which correspond to the sleeve being used.

Insert the wire(s) into one end of the sleeve.

Position the pliers' jaws in the middle of the half of the metal shaft where the wire(s) are.

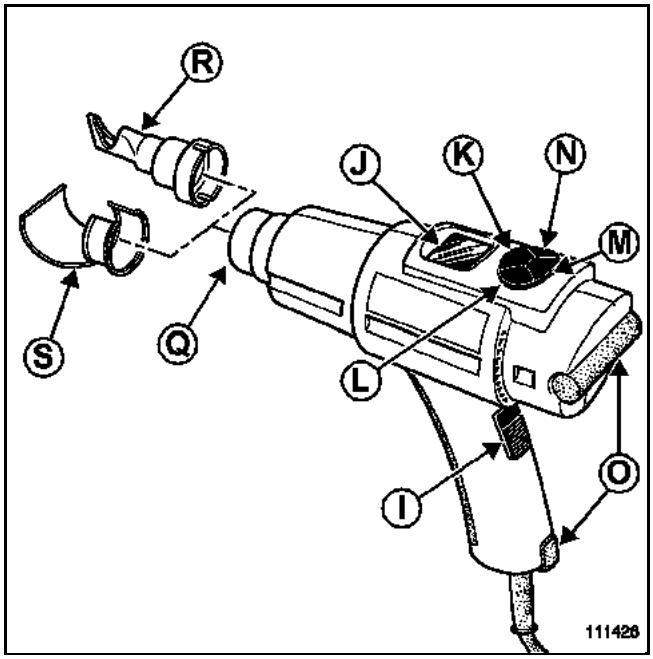
Squeeze the handles fully together to crimp the sleeve onto the wire(s). Crimping is complete once the pliers are opened again.

Check that the copper of the wire is correctly crimped and that the plastic part of the sleeve has not been cut.

Repeat the crimping operation on the other end of the sleeve.

Note:
If the wire is not correctly crimped, cut the wire at the sleeve and start the operation again with a new sleeve.

**3 - Heat gun.**




**IMPORTANT**
**Before using the gun, the user must familiarise themselves with the safety advice in the user's manual provided by the manufacturer.**

● **Introduction to the gun:**

The heat gun is recommended for contracting heat shrinkable sleeves.
For other applications, the user must take the precautions and advice in the user's manual into account.

● **Description of the heat gun:**

(**I**) = On (1)/off (0) switch.
(**J**) = Display screen.
(**K**) = SELECT MENU button.
(**L**) = + button for setting parameters.
(**M**) = STANDBY button (pause/cooling).
(**N**) = - button for setting parameters.
(**O**) = Supports for resting the tool on a bench.
(**P**) = Tool air inlet.
(**Q**) = Tool air outlet.

● **Accessories:**

(**R**) = Concentrator nozzle.
(**S**) = Heat shield nozzle.

Note:
The concentrator nozzle (**R**) is recommended when using the heat gun on the crimping or self-solder sleeves in the kit.

**NOTE**
**The heat shield nozzle (S) can be used for contracting single heat shrinkable sheaths. Do not use it for contracting the crimping or self-solder sleeves in the kit.**

● **General information on the setting parameters:**

When contracting the sleeves in the kit, use the FREE program and change the settings as recommended. A memory function recalls the program and settings from the last time the gun was used.

● **Switching on the gun:**

Connect the appliance to the mains electricity supply (**230 Vac** - **50 Hz** or **60 Hz**), respecting all precautions.
Push the switch (**I**) on (1).
The appliance will switch on at the programs and settings most recently used.

**IMPORTANT**
**The gun starts heating immediately.**

**IMPORTANT**
**Before putting the gun away in its case or anywhere else, leave it to cool down to ambient temperature.**

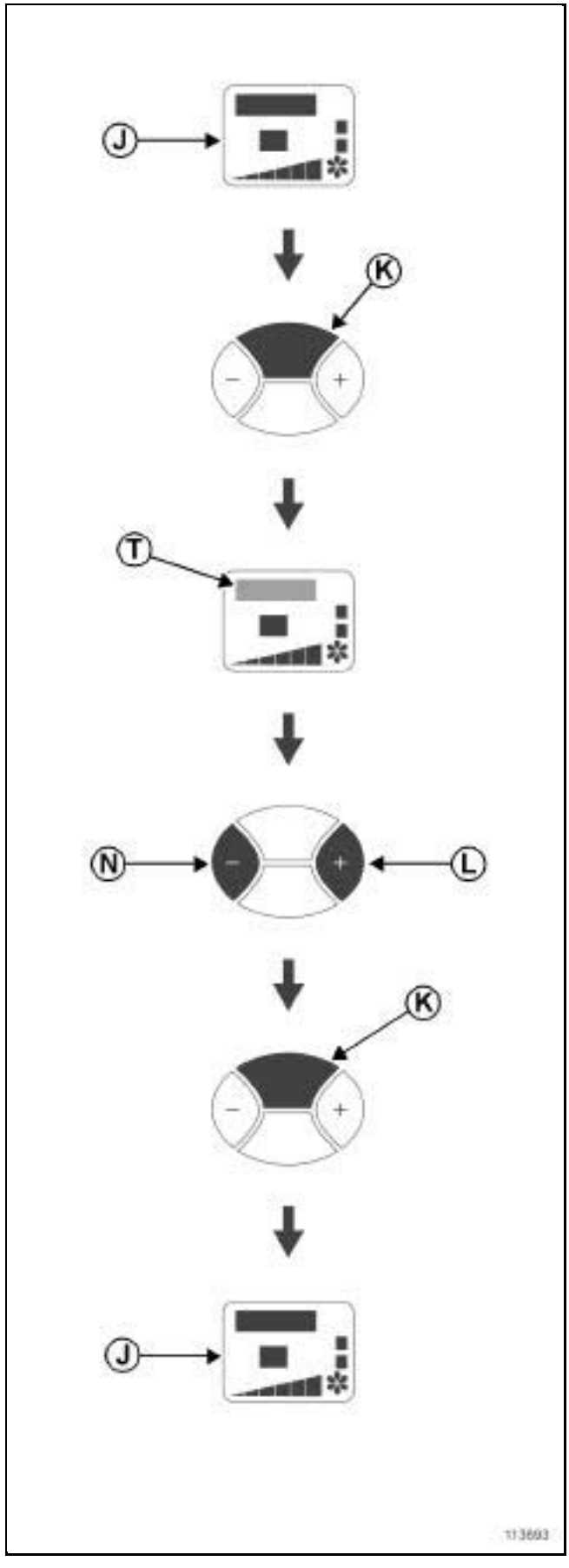
● **Operating instructions:**

The heat gun is used in two ways. It can either be held in the hand and used directly. Or it can be set down on its supports (**O**) on a clean and tidy bench. The latter has the advantage of leaving the user with both hands free.

● **Programs:**

Always work with the FREE program shown on the screen (**J**) at (**T**). If it is not shown, perform the following operation:

– press menu selection button (**K**) once,
– program field (**T**) on the display screen (**J**) flashes,
– select the free program using the + (**L**) or - (**N**) buttons,
– press the menu selection button (**K**) once, so that field (**T**) on the display screen (**J**) stops flashing.

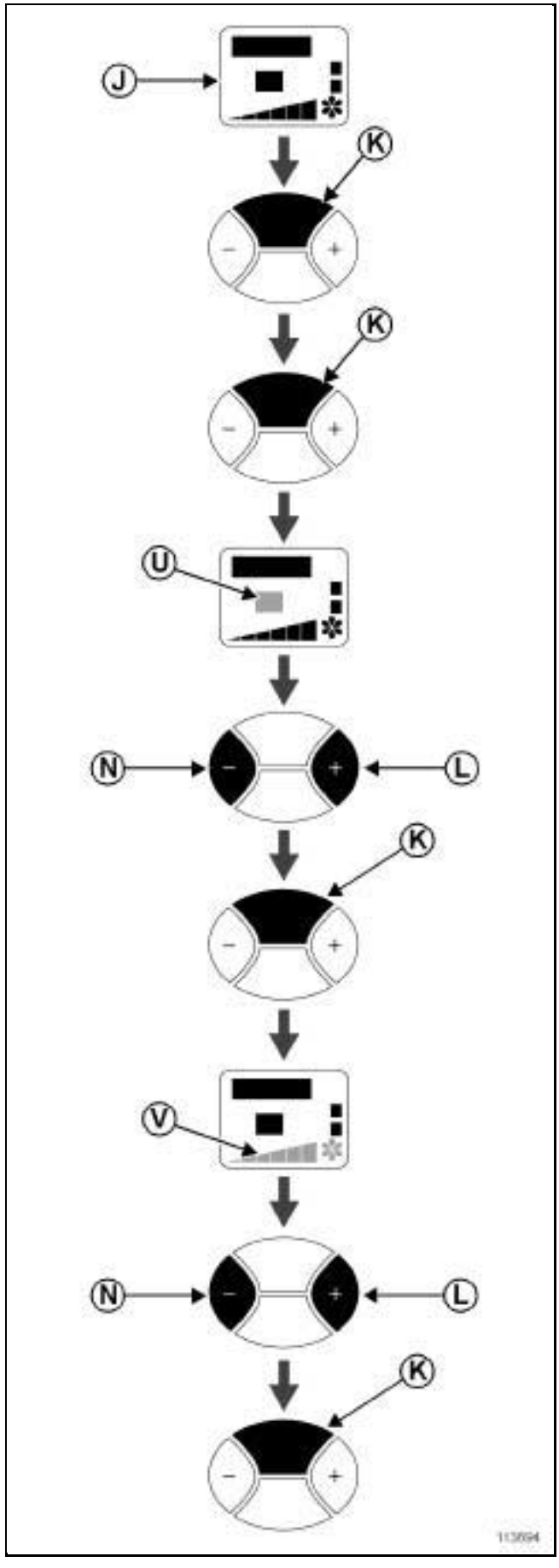


● **Temperature and air flow settings:**

To change the program settings (the FREE program is recommended), carry out the following operation:

- press the menu selection button (**K**) twice,
- the temperature field (**U**) on the display screen (**J**) flashes,
- adjust the temperature using the + (**L**) or - (**N**) buttons,
- press the menu selection button (**K**) once,
- the air flow field (**V**) on the display screen (**J**) flashes,
- adjust the air flow using the + (**L**) or - (**N**) buttons,
- press the menu selection button (**K**) once, so that the fields on the display screen (**J**) stop flashing.

Note:
When using the heat gun on crimping or self-solder sleeves, the air flow is always on the maximum setting, only the temperature varies.



● **Special modes (COOL/PAUSE):**

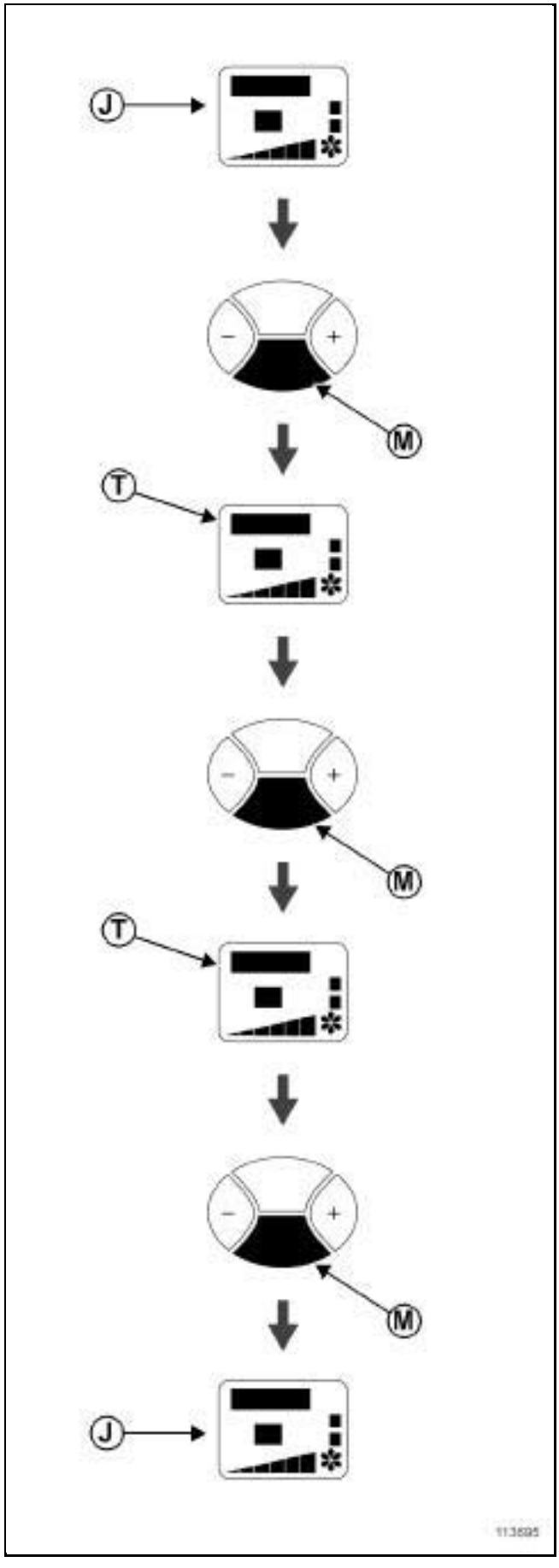
After use and before setting switch (**A**) to OFF (0), cool the gun. Similarly, during brief pauses or for lower power consumption, switch the gun to PAUSE mode by carrying out the following operation.

Before switching off the heat gun:

– press the STANDBY button (**M**) once,
– the program field (**T**) on the display screen (**J**) shows COOL,
– wait until the temperature goes down to **150°C** and set switch (**A**) to OFF (0).

To switch to economy mode:

– press the STANDBY button (**M**) once,
– the program field (**T**) on the display screen (**J**) shows COOL,
– press the STANDBY button (**M**) once,
– the program field (**T**) on the display screen (**J**) shows WAIT,
– the gun is in economy mode,
– press the STANDBY button (**M**) once to recover the previous settings and start heating again.



Note:
This relates to **the generic repair procedure**.

**1 - Choosing the sleeve.**

The are two possible techniques available:
- self-solder sleeves,
- crimp sleeves.

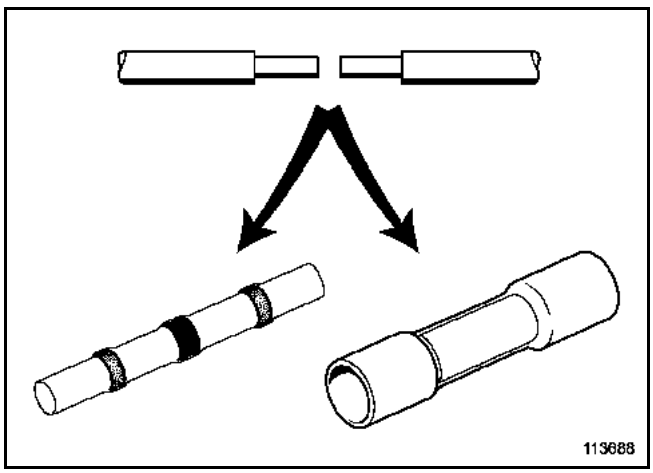
For each technique there are 3 sizes of sleeve.

The choice of sleeve depends on the following criteria:

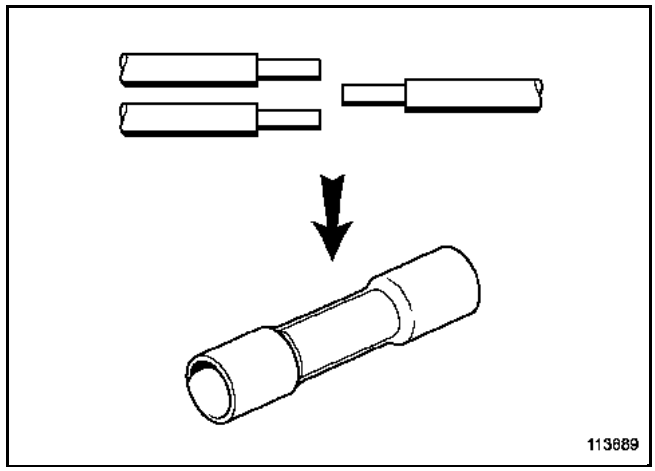
● **Type of operation.**

Note:
This is **stage 1** when using the label.

**If wire to wire (1-to-1)**, use crimp sleeves or self-solder sleeves.




**If 2 wires and 1 wire (2-to-1)**, **only** use crimp sleeves. In this case, the seal can no longer be guaranteed. Do not use this solution when a tight seal is needed (engine and underbody areas and damp areas of the doors and boot).




● **Wire cross-sections.**

Note:
This is **stage 2** when using the label.

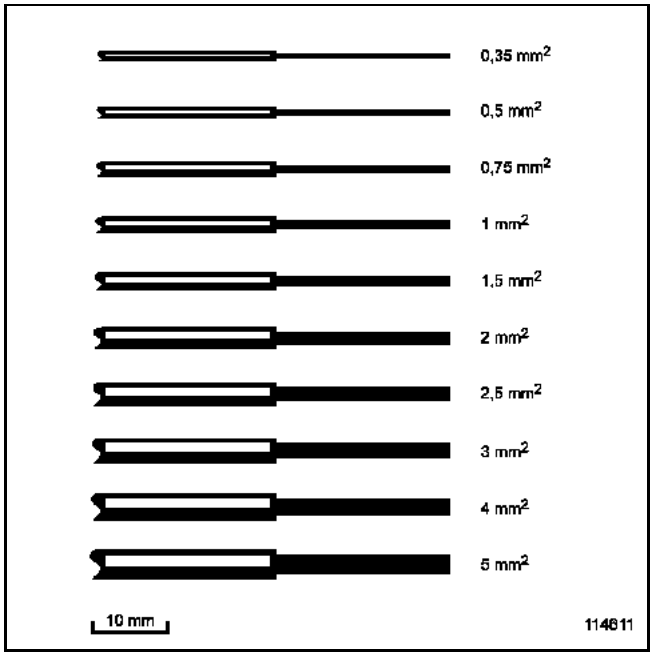
See the sleeve choice table taken from the label.

Note:
The columns corresponding to the wire cross-sections give a representative overview of the different cases.

Identify the cross-section of the wire which is the subject of the operation. Use the diagram showing pictures of wires which correspond to the wire cross-sections.

Check that the diagram is at scale 1.

Find the section of the stripped wire.




Refer to the columns of wire cross-sections to find its case.

Note:
If the case in question is not present, refer to the special cases.

Example 1.
Joining 2 wires, each **2 mm²**, together (1-to-1 type operation). Look at the upper section of the columns (1-to-1).
Each wire (A and C) has a **2 mm²** section. Refer to the line where:
- column A shows **1 x 2 mm²**,
- and column C shows **1 x 2 mm²**.

Example 2.
Joining 3 wires together (2-to-1 type operation). Look at the lower section of the columns (2-to-1).
On one side the 2 wires (A and B) both have a **1 mm²** section. On the other side wire C has a **2 mm²** section.
Refer to the line where:
- column A & B show **2 x 1 mm²**,
- and column C shows **1 x 2 mm²**.

● **Identifying the settings.**

Note:
This is **stage 3** when using the label.

After having found the case in question, follow the corresponding line to find the setting parameters.
The settings correspond to the lengths to be stripped and the temperature of the heat gun.

The column corresponding to these parameters gives the recommended sleeve.

Note:
If several sleeves are possible for the same operation, choose the one best suited for the number of wires to be repaired, the wiring layout and the vehicle layout (thickness of the harness, available room etc).

As relates to the previous examples.

Example 1.
2 possible sleeves:
- Either the blue self-solder sleeve.
- Or the red crimp sleeve.

Example 2.
- Only the blue crimp sleeve is possible.

● **Special cases**

If the case in question is not shown in the selection table, apply the following rules to select a sleeve.

In all cases, identify the cross-section of each wire (copper strands).

● **Case of a wire joint between 1 wire and 1 wire (most common situation).**

**Conditions for self-solder sleeves:**

Add together the 2 wire cross-sections (copper strands):

If **0.3 mm²** ≤ (section 1 + section 2) ≤ **0.8 mm²**, use the self-solder sleeve with **clear rings**.
Strip **10 mm** from each wire.
The temperature setting is **300°C**.

If **0.8 mm²** ≤ (section 1 + section 2) ≤ **2 mm²**, use the self-solder sleeve with **red rings**.
Strip **12 mm** from each wire.
The temperature setting is **340°C**.

If **2 mm²** ≤ (section 1 + section 2) ≤ **4 mm²**, use the self-solder sleeve with **blue rings**.
Strip **15 mm** from each wire.
The temperature setting is **400°C**.

**Conditions for crimp sleeves:**

Consider the section of each wire separately.

If **0.5 mm²** ≤ each section ≤ **1.5 mm²**, use the red crimp sleeve.
Strip **7 mm** from each wire.
The temperature setting is **280°C**.

If **1.5 mm²** ≤ each section ≤ **2.5 mm²**, use the blue crimp sleeve.
Strip **7 mm** from each wire.
The temperature setting is **300°C**.

If **3 mm²** ≤ each section ≤ **6 mm²**, use the crimp sleeve.
Strip **8 mm** from each wire.
The temperature setting is **320°C**.

● **Case of a wire joint between 2 wires and 1 wire (less common situation).**

**Conditions for crimp sleeves:**

Add together the 2 wire cross-sections (copper strands) found on one side of the sleeve to find ***Sum side 1***.

If **0.5 mm²** ≤ ***Sum side 1*** ≤ **1.5 mm²**.
**And** if **0.5 mm²** ≤ wire cross-section side 2 only ≤ **1.5 mm²**, use the **red crimp sleeve**.
The temperature setting is **280°C**.

If **1.5 mm²** ≤ ***Sum side 1*** ≤ **2.5 mm²**.
**And** if **0.5 mm²** ≤ wire cross-section side 2 only ≤ **1.5 mm²**, use the **blue crimp sleeve**.
The temperature setting is **300°C**.

If **3 mm²** ≤ ***Sum side 1*** ≤ **6 mm²**.
**And** if **0.5 mm²** ≤ wire cross-section side 2 only ≤ **1.5 mm²**, use the **yellow crimp sleeve**.
The temperature setting is **320°C**.

**For stripping the wires:**

**7 mm** is stripped from the single wire (side 2) for red and blue crimp sleeves and **8 mm** for the yellow sleeve.

If the two wires (side 1) have the same cross-section, strip **10 mm** from them for red and blue crimp sleeves and **11 mm** for the yellow sleeve.

If the 2 wires (side 1) have different cross-sections, then:
For red and blue crimp sleeves, strip **10 mm** from the smaller cross-section and **7 mm** from the larger cross-section.
For the yellow sleeve, strip **11 mm** from the smaller cross-section and **8 mm** from the larger cross-section.

**NOTE**
**If no sleeve corresponds to the case in question, the operator cannot repair the wiring. Replace the wiring harness.**

● **Settings table (taken from the label).**

| | Sleeves / Wire cross-sections | | Self-solder | | | | | | Crimp | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | clear | | red | | blue | | red | | blue | | yellow | |
| | | | $0.3^2 \le A+C \le 0.8^2$ | | $0.8^2 \le A+C \le 2^2$ | | $2^2 \le A+C \le 4^2$ | | $0.5^2 \le A+B \le 1.5^2$ & $0.5^2 \le C \le 1.5^2$ | | $1.5^2 \le A+B \le 2.5^2$ & $1.5^2 \le C \le 2.5^2$ | | $3^2 \le A+B \le 6^2$ & $3^2 \le C \le 6^2$ | |
| | A | C | A, C L (mm) | T (°C) | A, C L (mm) | T (°C) | A, C L (mm) | T (°C) | A, C L (mm) | T (°C) | A, C L (mm) | T (°C) | A, C L (mm) | T (°C) |
| 1→1 | 1x0.35 mm² | 1x0.35 mm² | 10, 10 | 300 | | | | | | | | | | |
| | 1x0.35 mm² | 1x0.5 mm² | 10, 10 | 300 | 12, 12 | 340 | | | | | | | | |
| | 1x0.5 mm² | 1x0.5 mm² | | | 12, 12 | 340 | | | 7, 7 | 280 | | | | |
| | 1x0.5 mm² | 1x1 mm² | | | 12, 12 | 340 | | | 7, 7 | 280 | | | | |
| | 1x0.75 mm² | 1x0.75 mm² | | | 12, 12 | 340 | | | 7, 7 | 280 | | | | |
| | 1x0.75 mm² | 1x1 mm² | | | 12, 12 | 340 | | | 7, 7 | 280 | | | | |
| | 1x1 mm² | 1x1 mm² | | | 12, 12 | 340 | 15, 15 | 400 | 7, 7 | 280 | | | | |
| | 1x1 mm² | 1x1.5 mm² | | | | | 15, 15 | 400 | 7, 7 | 280 | | | | |
| | 1x1.5 mm² | 1x1.5 mm² | | | | | 15, 15 | 400 | 7, 7 | 280 | 7, 7 | 300 | | |
| | 1x1.5 mm² | 1x2 mm² | | | | | 15, 15 | 400 | | | 7, 7 | 300 | | |
| | 1x2 mm² | 1x2 mm² | | | | | 15, 15 | 400 | | | 7, 7 | 300 | | |
| | 1x2 mm² | 1x2.5 mm² | | | | | | | | | 7, 7 | 300 | | |
| | 1x2.5 mm² | 1x2.5 mm² | | | | | | | | | 7, 7 | 300 | | |
| | 1x3 mm² | 1x3 mm² | | | | | | | | | | | 8, 8 | 320 |
| | 1x3 mm² | 1x4 mm² | | | | | | | | | | | 8, 8 | 320 |
| | 1x6 mm² | 1x6 mm² | | | | | | | | | | | 8, 8 | 320 |

| | A & B | C | A, B, C L (mm) | T (°C) | A, B, C L (mm) | T (°C) | A, B, C L (mm) | T (°C) | A, B, C L (mm) | T (°C) | A, B, C L (mm) | T (°C) | A, B, C L (mm) | T (°C) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2→1 | 2x0.5 mm² | 1x1 mm² | | | | | | | 10, 10, 7 | 300 | | | | |
| | 1x0.5 mm² + 1x1 mm² | 1x1.5 mm² | | | | | | | 10, 7, 7 | 300 | 10, 7, 7 | 300 | | |
| | 2x1 mm² | 1x2 mm² | | | | | | | | | 10, 10, 7 | 300 | | |
| | 1x0.5 mm² + 1x1.5 mm² | 1x2 mm² | | | | | | | | | 10, 7, 7 | 300 | | |
| | 1x0.5 mm² + 1x3 mm² | 1x3 mm² | | | | | | | | | | | 11, 8, 8 | 320 |
| | 2x2 mm² | 1x6 mm² | | | | | | | | | | | 11, 11, 8 | 320 |
| Stripping/Temperature | | | mm | °C | mm | °C | mm | °C | mm | °C | mm | °C | mm | °C |

In the case of a 1-to-1 type operation, wires **A** and **C** denote the wires which are found at either side of the sleeve.

In the case of a 2-to-1 type operation, wires A and **B** denote the 2 wires which are found at the same side of the sleeve. **C** denotes the single wire on the other side.

**2 - Preparation.**

To start the preparatory stage, check that the wiring is sufficiently accessible and that the sleeves have been chosen.

– Detach the wires from the wiring.

– Check that the operating area is sufficiently spacious and that the sleeves can be fitted staggered (if there are several wires).

– Mark the wires to be cut, particularly if there are several wires the same colour.

– Cut the damaged wire(s). Stagger the cuts if a lot of wires are marked so that the sleeves are not all on top of each other. The cut must be made at a distance of no less than **50 mm** from the damaged section and in an area where the sleeve will remain straight.

– Cut the replacement wire to length(s) identical to those removed from the harness. If the self-solder sleeves are being used, add **30 mm** for the wire joints.

**IMPORTANT**
**The cross-section of replacement wire must not be less than the original cross-section of wire.**

**IMPORTANT**
**Use a 0.5 $mm^2$ wire to repair a 0.35 $mm^2$ wire.**

**IMPORTANT**
**The temperature class of the replacement wire must be equal to or greater than class T3. For the repair, use the wires recommended by the Parts Department, checking that they are suitable for your requirements.**

– Strip the ends by the lengths indicated in relation to the sleeve chosen, using the stripping pliers (see **88A, Wiring, Wiring repair kit: Use**).

– Protect sensitive areas close to the wiring with the heat shield.

**3 - Self-solder sleeves.**

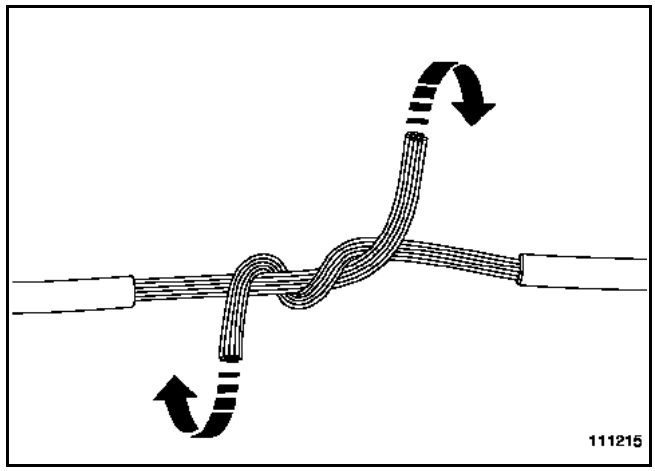
Note:
Fit the self-solder sleeves (connection and heating) line by line, sleeve by sleeve.

● **Connection.**

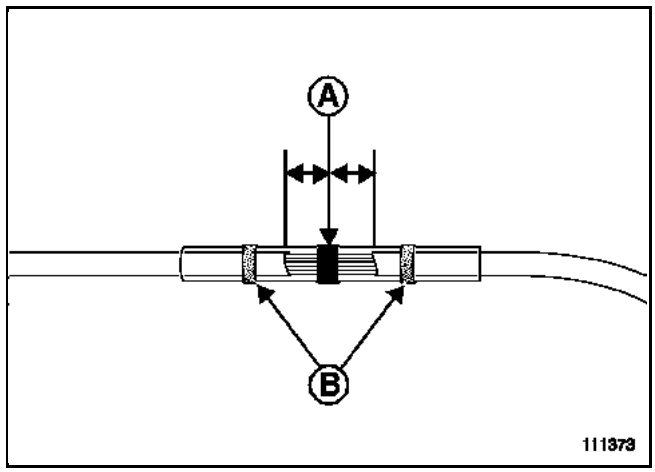
The equipment necessary and the wires are ready for the operation:

– Slip the self-solder sleeve onto one of the wires.

– Connect the wires by twisting the stripped sections around each other.




– Slide the sleeve over the stripped section. The ring of solder should end up in the centre of the stripped and twisted wires (**A**). The stripped and twisted section of the wires must be located between the 2 sealing rings (**B**).



**IMPORTANT**
**When the sleeve is positioned, check that all the copper strands remain flat and subsequently are not at risk of perforating the sleeve. Start the operation to join the wires again if necessary.**

**NOTE**
**The sealing rings must be clearly located on the insulated section of the wires (B) and not on the copper or where the copper and the insulated section meet. Start the operation to join the wires again if necessary.**

Once the wires are joined, start the heating operation.

- **Heating the self-solder sleeve.**

  – Switch on the heat gun fitted with the concentrator nozzle after familiarising yourself with the precautions for use (see **88A, Wiring, Wiring repair kit: Use**).

  – Adjust the temperature and the air flow to the values indicated (see **88A, Wiring, Wiring repair kit: Use**).

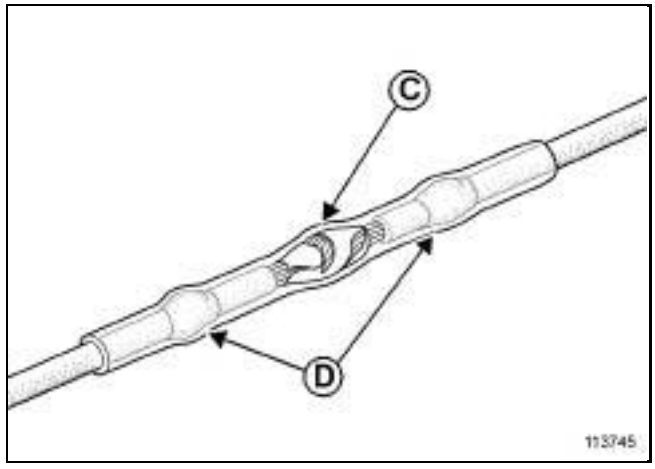
  – Check that the sensitive areas close to the sleeve and the other electrical wires are not at risk of damage.

  – Heat the sleeve starting at the centre, concentrating the heat on the ring of solder and the stripped section of the wires.

  – When the copper and the ring of solder become hot enough, the ring of solder melts and runs in between the copper strands (**C**).

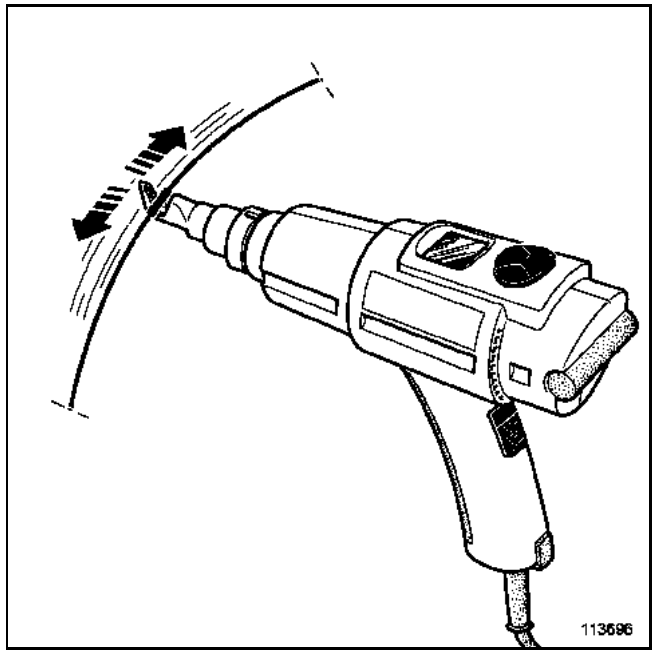
  – When the solder has completely melted, move the nozzle to the ends of the sleeve to finish shrinking the sheath.

  – The sealing rings of the sleeve tighten around the insulation of the wires (**D**).




Note:
Spend the majority of the recommended time on the ring of solder and the rest of the time on the ends of the sleeve.
The heating operation takes **30 s ± 10**. This time is a guide only. It can be reduced or increased depending on how efficient the heating is.

**IMPORTANT**
**Do not try to heat the sheath too quickly, use a backwards and forwards motion to ensure it does not burn.**
**Do not direct the flow of hot air onto the insulation of the wires so as not to burn it.**



**IMPORTANT**
**Wait for the sleeve to cool before manipulating it to maintain the quality of the solder (minimum waiting period: 1 minute).**
**Do not bend the sleeve (even when cool) so as to not damage the quality of the solder or the sealing properties of the sleeve.**

Note:
– Do not move during installation.
– Do not overheat the sleeve.
– Do not move the sleeve or wires until they have cooled.

If several self-solder sleeves must be positioned, repeat the operation sleeve by sleeve.

When the heating operations have finished, move on to the checking operation (see **88A, Wiring, Wiring: Check**).

**4 - Crimp sleeves.**

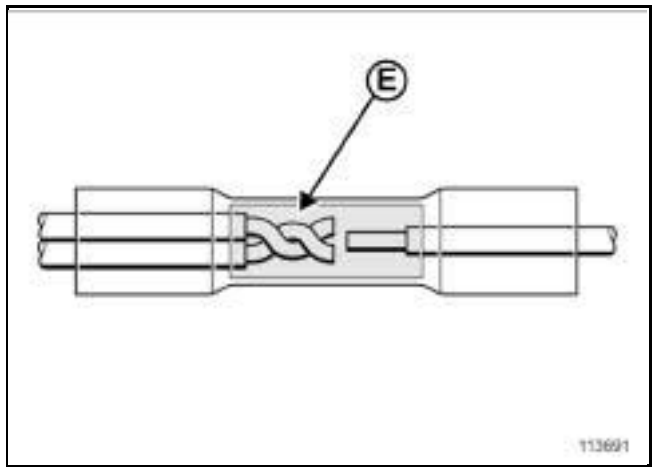
Note:
For a wire-to-wire join, go straight to the crimping operation.

● **Special notes for joining 2 wires to 1 wire.**

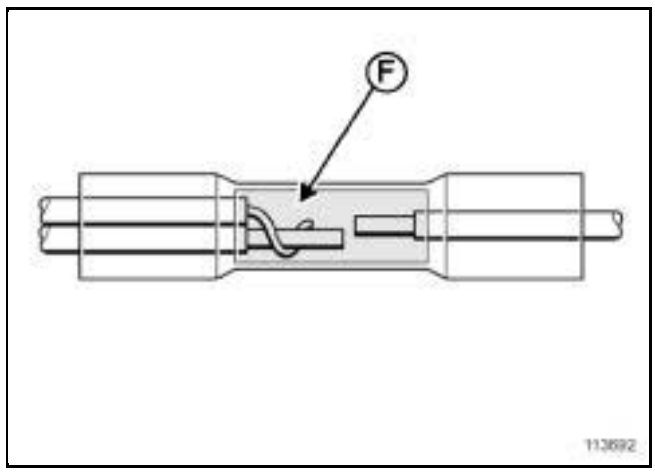
**IMPORTANT**
**Do not use if a tight seal is needed (engine and underbody areas and damp areas of the doors and boot).**

When joining 2 wires to 1 wire, first connect the 2 wires from the same end in the following way:

– If the 2 wires have identical diameters, twist together the stripped section of the 2 wires (**E**), before putting them into the sleeve.




– If the 2 wires have different diameters, wind the stripped section of the smaller wire around that of the larger wire (**F**) before inserting them in the sleeve.



● **Crimping.**

The equipment necessary and the wires are ready for the crimping operation:

– Take the crimping pliers. Squeeze the handles fully together to unlock the pliers and open the jaws (see **88A, Wiring, Wiring repair kit: Use**).

– On the pliers, find the crimping jaws which correspond to the sleeve chosen.

– Insert the wire(s) into one end of the sleeve up to the stop located inside the metal barrel of the sleeve.

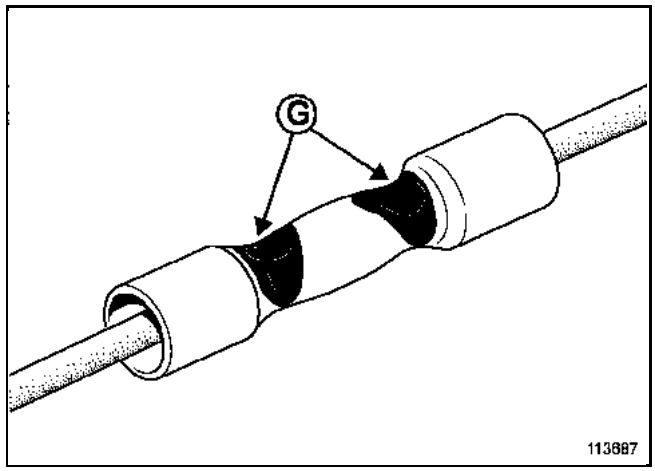
– Position the pliers' jaws around the middle of the section of the metal barrel where the wire(s) are.

– Squeeze the handles fully together to crimp the sleeve onto the wire(s). Crimping is complete once the pliers are opened again.

**IMPORTANT**
**Check that the copper of the wire is correctly crimped and that the plastic part of the sleeve has not been cut. If the wire has been stripped by the correct length and correctly inserted in the metal barrel, then the copper of the wire should barely jut out from the shaft.**

Note:
If the wire is not correctly crimped, cut the wire before the sleeve and start the operation again with a new sleeve.

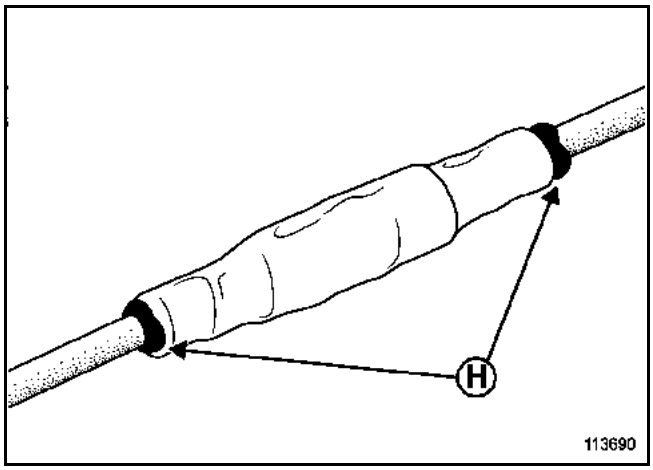
Repeat the crimping operation on the other end of the sleeve to obtain the result below.




The pliers have correctly crimped each wire on the halves of the metal barrel at (**G**) without damaging the plastic.

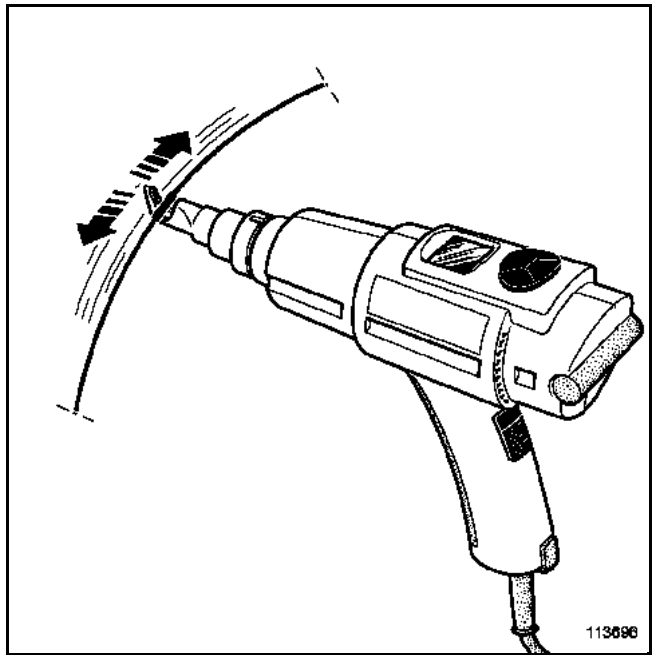
**Heating the crimp sleeve.**

- Switch on the heat gun fitted with the concentrator nozzle after familiarising yourself with the precautions for use (see **88A, Wiring, Wiring repair kit: Use**).
- Set the temperature and the air flow to the values indicated, following the procedure in this note (see **88A, Wiring, Wiring repair kit: Use**).
- Check that the sensitive areas close to the sleeve and the other electrical wires are not at risk of damage.
- Heat the sleeve starting at the centre.
- When the sheath starts to contract, move the nozzle to one of the ends.
- The sheath continues to contract and produces a glue.
- When the end of the sleeve has completely contracted and the glue has correctly covered the opening of the sleeve, repeat the operation on the other end to obtain the result shown at (**H**).




Note:
Spend the majority of the recommended time on the metal barrel and the rest of the time on the ends of the sleeve.
The heating operation takes **30 s ± 10**. This time is a guide only. It can be reduced or increased depending on how efficient the heating is.

**IMPORTANT**
**Do not try to heat the sheath too quickly, use a backwards and forwards motion to ensure it does not burn.**
**Do not direct the flow of hot air onto the insulation of the wires so as not to burn it.**



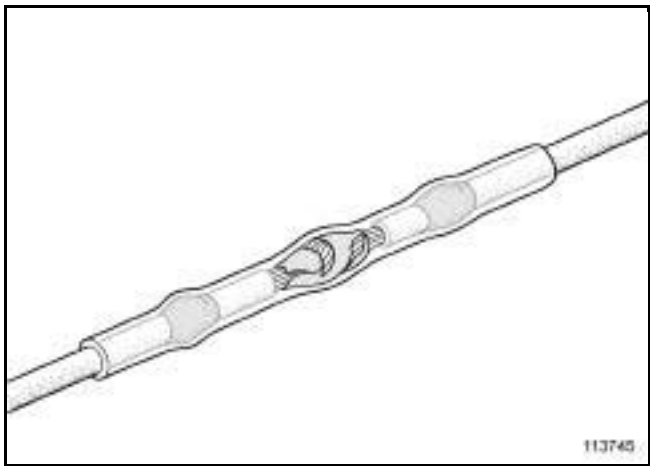

**IMPORTANT**
**Wait for the sleeve to cool before manipulating it to ensure that the sealing properties of the sleeve are not affected (minimum waiting period: 1 minute).**
**Do not bend the sleeve (even when cool) so as to not damage the sealing properties of the sleeve.**

When the heating operations have finished, move on to the checking operation (see **88A, Wiring, Wiring: Check**).

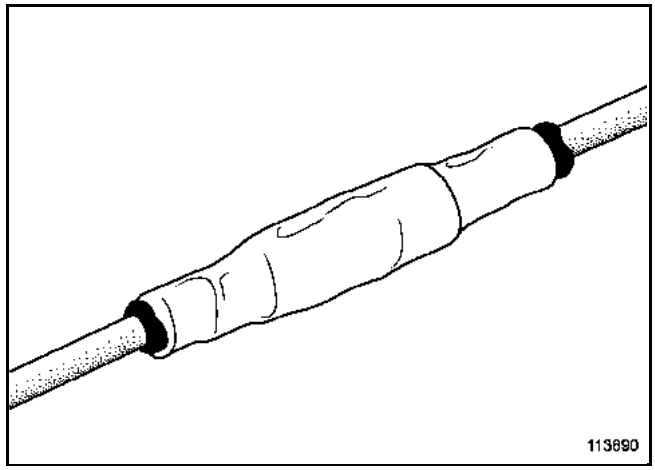
**1 - Visual checks.**

- The insulation of the wires is within the sleeve.
- (Self-solder sleeves) The sealing rings must be clearly located on the insulated section of the wires.
- (Self-solder sleeves) The solder has completely melted.
- (Crimp sleeves) The adhesive of the crimp sleeves forms a barrier at the ends of the sleeves.
- The sleeve has completely contracted around the insulation of the wires.
- The sleeve is not cut, slit, discoloured or pierced by a copper strand.
- The insulation of the wires does not show any sign of damage caused by overheating.
- The wiring and the area surrounding it have not been damaged by the heating operation.

Result of a correctly applied self-solder sleeve.

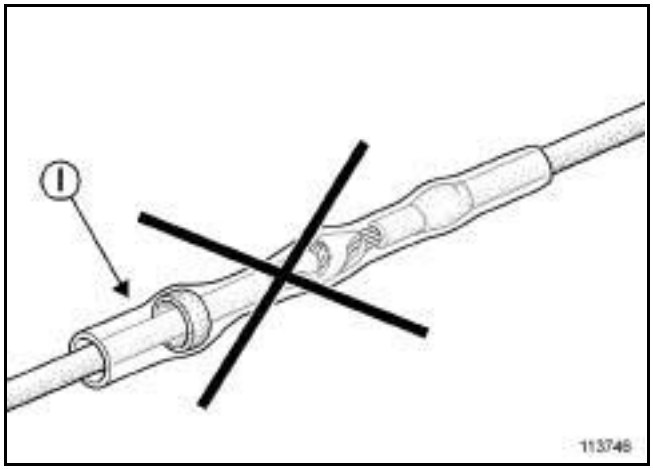



Result of a correctly applied crimp sleeve.

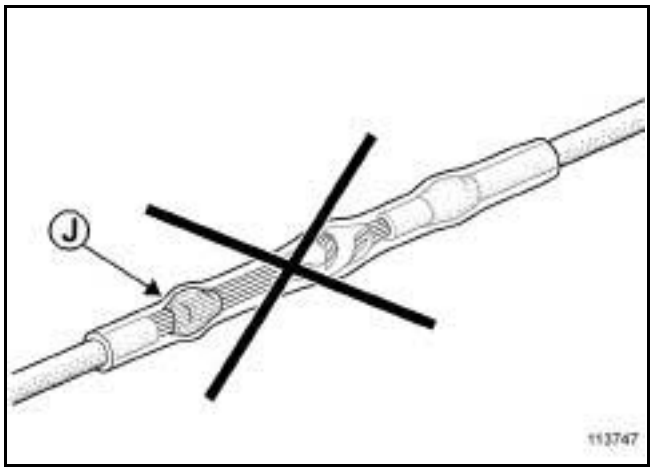


**IMPORTANT**
**The various struck-through cases are strictly forbidden.**

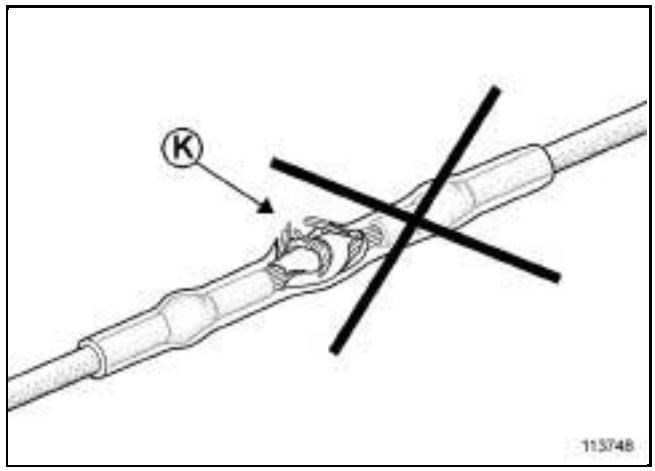
The self-solder sleeve has not been correctly shrunk. At (**I**), the sealing ring has not contracted around the insulation of the wire.



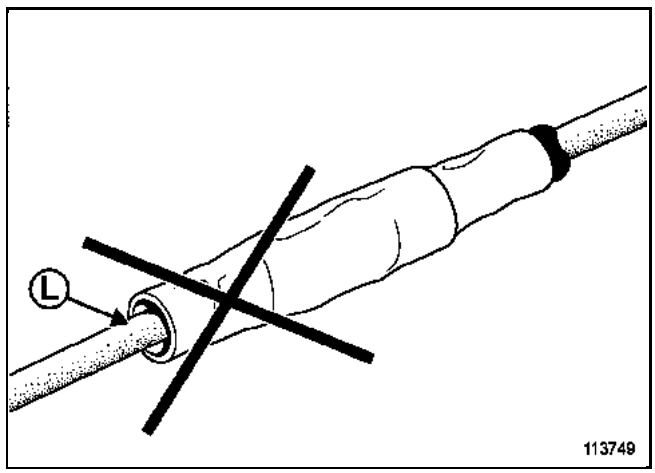

The sealing ring of the self-solder sleeve is directly on the copper of the wire at (**J**).



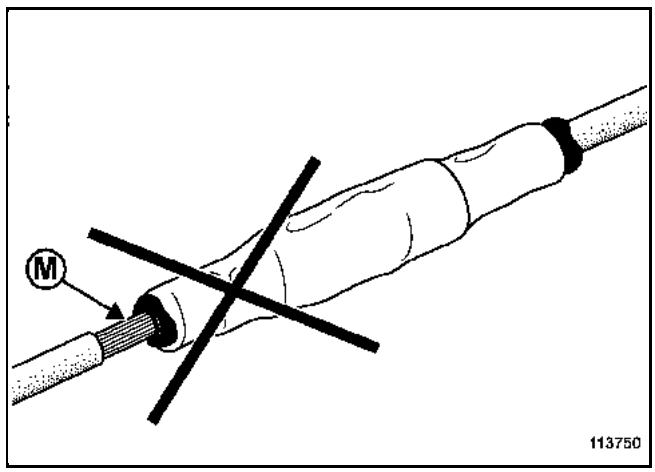

The protruding strands of the wire have pierced the self-solder sleeve at (**K**) during contraction.



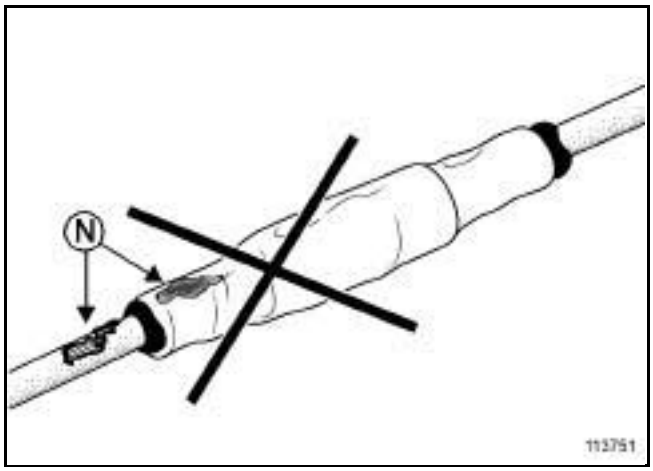

The crimp sleeve has not been correctly shrunk. At (**L**), the adhesive does not form a barrier at the end of the sleeve.




The adhesive of the crimp sleeve is directly on the copper of the wire at (**M**).



The sleeve and the insulation of the wire show signs of damage at (**N**) caused by overheating.




Note:
Reconnect the battery (see the **MR corresponding to the vehicle, 80A, Battery, Battery: Removal - Refitting**).

**2 - Check with the diagnostic tool.**

When a repaired line can be tested with the diagnostic tool, run this check.

**3 - Function check.**

Check that the component or the function of the repaired line is working correctly. If the case in question requires it, carry out a test drive.

Note:
Always check for faults after repair.

Refer to the fault finding procedure for the function concerned.

**4 - Fitting and protection.**

After the operation:

- reposition the wires concerned in the main harness,
- tape up the main harness using adhesive tape,
- protect the harness as it was originally using equivalent (noise or anti-damage) or superior protection with the protections recommended by the Parts Department.

**IMPORTANT**
**Any repair which requires a special heat shield for the wiring are forbidden. Replace the wiring harness.**

**IMPORTANT**
**Check that the wiring is correctly secured and protected to avoid any wear by rubbing and any noise disturbance.**

**5 - Final check.**

After any operation on a wiring harness, check that there are no faults with the diagnostic tools (Clip, EasyClip etc).

Refer to the corresponding fault finding procedure.

If a fault is present, pass on the vehicle fault finding to a qualified operator: automotive electrician, technician agent or cotech (level 2 minimum).

**IMPORTANT**
**Apply this procedure when there is a connector-wiring kit. Unless the connector-wiring kit is linked to one of the sensitive lines listed in the specific procedures reference table** (see **88A, Wiring, Wiring: Precautions for repair**)**. In this case, apply the specific procedure for the sensitive line concerned.**

**1 - Wiring-Connector kit.**

A wiring-connector kit enables a repair to be carried out when the connector is defective or when the fault is located less than **10 cm** from the connector.

A wiring-connector kit is generally made up of:

- at least 1 connector,
- crimped wires with corresponding contacts,
- sealing components if the connector is sealed,
- the self-solder or crimp sleeves necessary for the repair,
- other components specific to the function concerned (e.g. fuses).

**2 - Using a wiring-connector kit.**

Except in the specific outlined cases, use the wiring-connector kits as follows:

- check that the kit is complete,
- check that the connnector configuration (position of wires in the cells of the connector) corresponds to your needs,
- check that the wire cross-sections of the wiring-connector kit are equal to or larger than the cross-section of wires to be repaired,
- mark the wires to ensure that the tracks are not reversed,

**IMPORTANT**
**The colour of the wires cannot serve as a marker. In certain cases, wiring-connector kits can have different colours to those of the wiring to be repaired.**

- cut the connector wires to be replaced to a length greater than **100 mm** and stagger the cuts,
- shorten the wiring-connector kit wires so as to obtain wires the same lengths as those cut from the wiring to be repaired. For self-solder sleeves, add **30 mm** for the wire joints,
- apply the generic repair procedure for the joint (see **88A, Wiring, Wiring: Repair**).

**3 - Checking and fitting the repair with wiring-connector kits.**

- Carry out the generic repair procedure check (see **88A, Wiring, Wiring: Check**) or that of the specific procedures if it is a specific case (see **88A, Wiring, Wiring: Precautions for repair**).
- Apply the recommendations from the generic repair procedure concerning the fitting and fuses (see **88A, Wiring, Wiring: Check**).

**4 - Final check.**

After any operation on a wiring harness, check that there are no faults with the diagnostic tools (Clip, EasyClip etc).

Refer to the corresponding fault finding procedure.

If a fault is present, pass on the vehicle fault finding to a qualified operator: automotive electrician, technician agent or cotech (level 2 minimum).

**IMPORTANT**
**This procedure relates to the repair of the multiplex network alone (twisted wires).**

**1 - Locating the fault.**

Use the diagnostic tool (clip) to test the multiplex network (see the fault finding procedure corresponding to the vehicle).

The diagnostic tool can detect the following short circuits on the multiplex network:

- short circuit between CAN L and **+ 12 V**,
- short circuit between CAN H and **+ 12 V**,
- short circuit between CAN H and earth,
- short circuit between CAN L and earth,
- short circuit between CAN L and CAN H,
- open circuits.

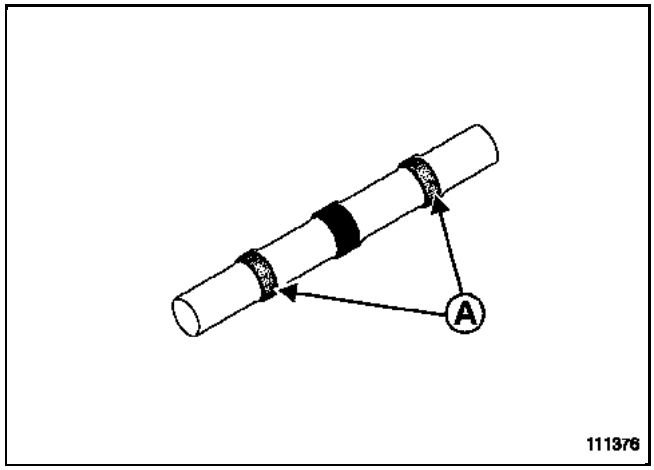
Note:
In the case of a short circuit between CAN-L and earth, communication between the various computers which make up the multiplex network is not interrupted. However, the multiplex network becomes sensitive to interference and can be the cause of an intermittent fault.

After having located the multiplex line fault, it is possible to repair it whilst applying all the necessary precautions outlined in this document.

**2 - Necessary equipment.**

For repairing the multiplex network, use the components of the wiring repair kit (see **88A, Wiring, Wiring repair kit: Description**).

Use the self-solder sleeves with red rings (**A**) for making the joints.



**3 - Repairing the multiplex line.**

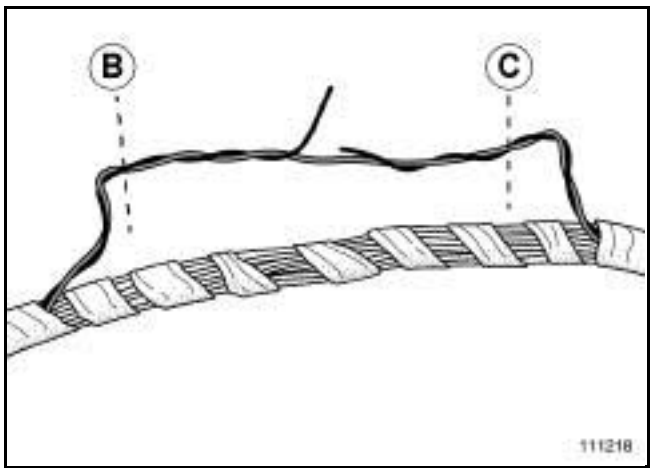
**IMPORTANT**
**Before starting to repair a multiplex line, it is necessary that you familiarise yourself with the use of the tools relating to this repair** (see **88A, Wiring, Wiring repair kit: Use**).

Disconnect the battery (see the **MR corresponding to the vehicle, 80A, Battery, Battery: Removal - Refitting**).

Remove the components necessary to enable access to the wiring.

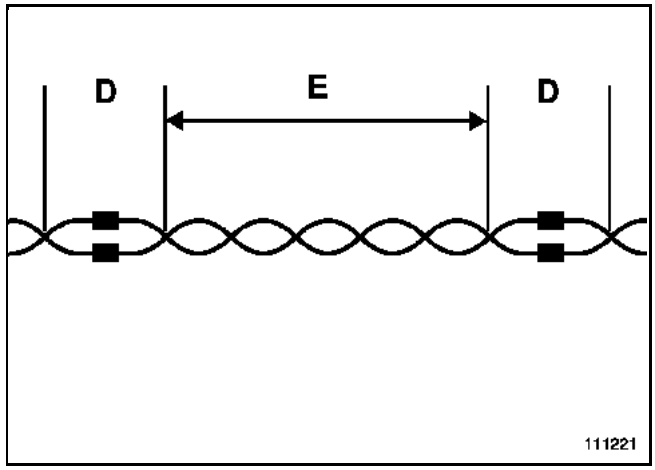
Detach the section of wire to be repaired from the main wiring.

Cut the wires at (**B**) and (**C**), **50 mm** on each side of the damage.

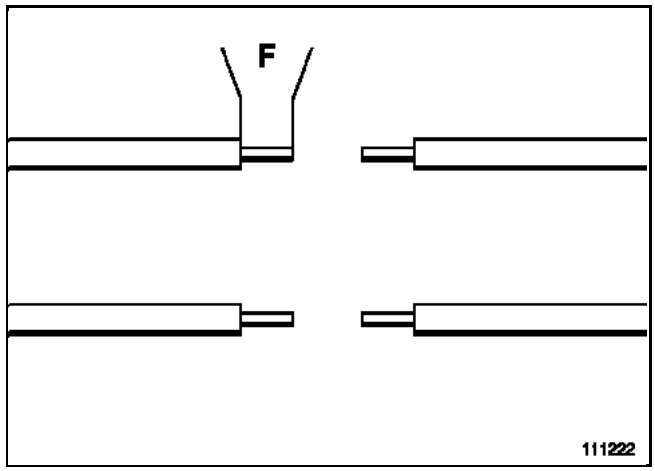



From the coil of twisted wires (**0.5 mm$^2$**, specific number of turns) to be used to repair the multiplexing, take a length of wire the same as that removed from the harness, **plus 30 mm** for the wire joints (see **88A, Wiring, Wiring repair kit: Description**).

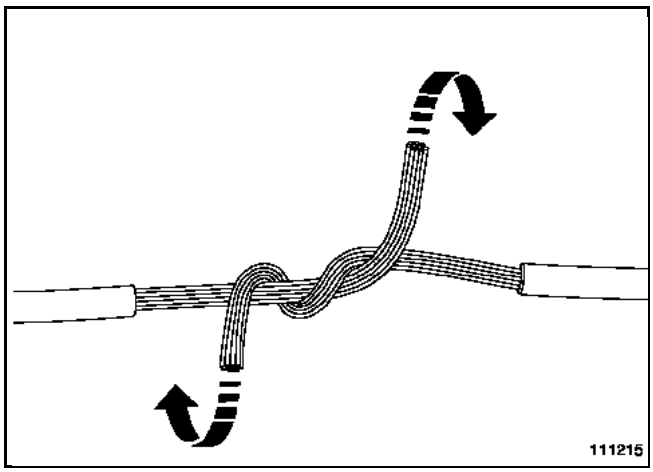
**IMPORTANT**
**Do not untwist the harness to be repaired more than 100 mm (D). The wires at (E) must be twisted uniformly along the repaired length.**




Strip each end of the wires by **10 mm (F)** at each side.

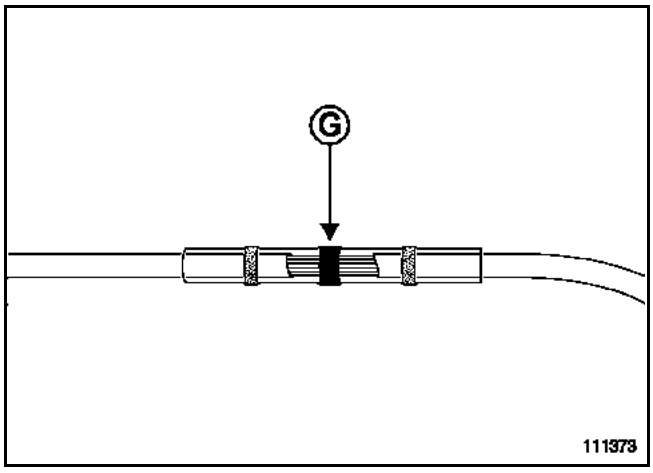


To join the wires, working wire by wire:
- slip the self-solder sleeve onto the wire,
- twist the end of the wires together.




**IMPORTANT**
**The colour of the wires (CAN H et CAN L) must be respected when they are being joined.**

- Position the sleeve with its solder ring in the centre of the wire joint.




- Switch on the heat gun.
- Adjust the temperature of the gun to **340°C** with the blower speed set to maximum (see **88A, Wiring, Wiring repair kit: Use**).
- Heat the sleeve so that the solder ring melts (**G**) onto the wires until the heat shrinkable sheath contracts.

Refer to the precautions for use relating to self-solder sleeves (see **88A, Wiring, Wiring: Repair**).

**IMPORTANT**
**Do not try to heat the sheath too quickly, use a backwards and forwards motion to ensure that it does not burn.**
**Do not direct the flow of hot air onto the insulation of the wires so as not to burn it.**

Note:
For the soldering to be complete and for the sheath to contract, the heating operation should last about **30 s ± 10**.
Spend the majority of the recommended time on the ring of solder and the rest of the time on the ends of the sleeve.
The recommended time is given as a guide. It can be reduced or increased depending on how efficient the heating is.

**NOTE**
**Wait for the sleeve to cool before manipulating it to maintain the quality of the solder (minimum waiting period: 1 minute).**
**Do not bend the sleeve (even when cool) so as to not damage the quality of the solder or the sealing properties of the sleeve.**

**4 - Checking the multiplex line.**

**IMPORTANT**
**After repairing the multiplex line, always check the multiplex network using the diagnostic tool.**

Note:
During the check with the diagnostic tool, move the lines forwards and backwards slightly. If a fault is recorded, start the operation again for the defective line.

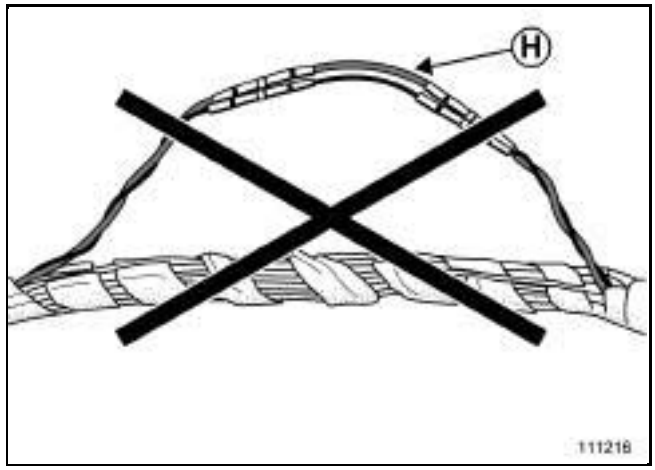
Refer to the fault finding procedure for the function concerned.

**IMPORTANT**
**After checking the multiplex line:**
- **refit it in the main harness,**
- **tape it up with adhesive tape.**

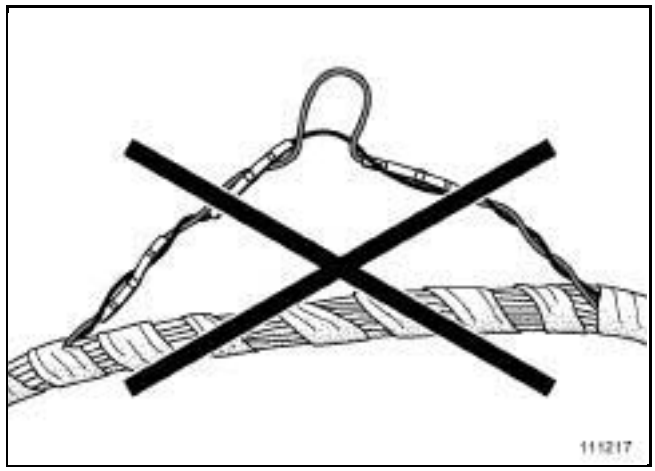
Apply the recommendations from the generic repair procedure concerning the fitting and fuses (see **88A, Wiring, Wiring: Check**).

**IMPORTANT**
**The various struck-through cases are strictly forbidden.**

No turns (twists) at (**H**).




The two wires added are of a different length.




**5 - Final check.**

After any operation on a wiring harness, check that there are no faults with the diagnostic tools (Clip, EasyClip etc).

Refer to the corresponding fault finding procedure.

If a fault is present, pass on the vehicle fault finding to a qualified operator: automotive electrician, technician agent or cotech (level 2 minimum).

**IMPORTANT**
**This procedure relates to the repair of airbag and pretensioner wiring only.**

Note:
Apply all the precautions and recommendations shown in the MRs.

**IMPORTANT**
**All work on airbag and pretensioner systems must be carried out by qualified trained personnel.**

**IMPORTANT**
**The pyrotechnic systems (pretensioners or airbags) must not be handled near to a heat source or flame; there is a risk that they may be triggered.**

**IMPORTANT**
**Before removing an electronic control unit (ECU) or before any operation on the safety systems or around them, the airbag computer must be locked using the diagnostic tool. When this function is activated all the trigger lines are inhibited, and the airbag warning light on the instrument panel is lit continuously.**

**IMPORTANT**
**Before any operation on a pyrotechnic component connection (connector or wiring) found defective during fault finding, disconnect the pyrotechnic component.**

**1 - Identify the solution.**

The case in question must figure in the table below. Otherwise, replace the wiring.

| Airbag and pretensioner components | Solutions |
|---|---|
| Under seat connector (Airbag warning light on) | Shunt the connector. See **Under seat connector** in this section. |
| Pyrotechnic component connectors (squib) (airbag triggers, pretensioner, etc.) | Replace the connector using the airbag connectors kit. See **Pyrotechnic component connectors** in this section. |
| Airbag computer connector | No operation. Change the wiring harness except in the following cases:<br>● If there is a specific procedure (OTS), along with the authorisation to apply it.<br>● If the connector lock is broken, lock replacement authorised. |
| Airbag and pretensioner harness damage | No operation except in specific conditions. See **Airbag and Pretensioner harness damage** in this section. |

**IMPORTANT**
**Any repair linked to the airbag function necessitates a specific check using the network's diagnostic tools.**

**2 - Under seat connector.**

When fault finding identifies an under seat connector fault, shunt the under seat connector following the procedure below:

Cut the electrical wires either side of the connector.

Apply the specific procedure for repairing multiplex lines (see **88B, Multiplex, Multiplex network: Repair**), except the part on locating the fault, to shunt the connector.

Note:
Check that the length of replacement wire is the same as that removed from the harness, **plus 30 mm** for the wire joints.

After the operation, check that the wire is not too taut or too long when the seat is furthest forward or back.

Protect the wires so that they are not damaged and this new branch is correctly maintained. Hanging loops are not allowed, regardless of the wires involved in the repair.

Carry out the specific airbag and pretensioner line repair checks. See **Airbag line repair check** and **Final check** in this section.

Note:
Check that the harness is correctly repositioned after the operation and that it does not obstruct the seat adjusting mechanisms.

**3 - Pyrotechnic component connectors.**

These are airbag and pretensioner trigger connectors.

Identify the connector concerned on the vehicle.

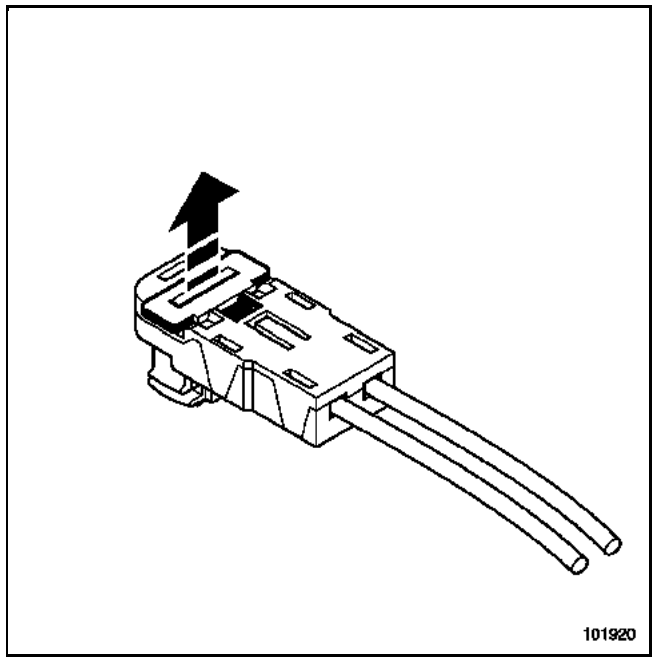
Repair is possible if it is a SQUIB connector.

Find the colour of the connector: Blue, green or orange.

Find the shape of the connector: Straight or angled.

Select the same connector (colour and shape) from the airbag connectors kit (see under DIALOGYS).

Example of an angled SQUIB connector.




Apply the specific procedure for repairing multiplex lines (see **88B, Multiplex, Multiplex network: Repair**), except the section on locating the fault, to replace the connector.

Carry out the specific airbag and pretensioner line repair checks. See **Airbag line repair check** and **Final check** in this section.

**4 - Airbag and Pretensioner harness damage.**

**IMPORTANT**
**No operation is authorised unless it is possible to check the repair using the diagnostic tool.**

Where the repair can be checked with the diagnostic tool:

- if it is a case of twisted wires with a cross-section less than or equal to **0.5 mm$^2$**, apply the multiplex lines specific repair procedure (see **88B, Multiplex, Multiplex network: Repair**), except the section on locating the fault, for the repair of the lines;

- if it does not concern twisted wires, apply the generic procedure for repairing the harness (see **88A, Wiring, Wiring: Check**).

Carry out the specific airbag and pretensioner line repair checks. See **Airbag line repair check** and **Final check** in this section.

**5 - Airbag lines repair check.**

Confirm the airbag line repair to ensure that the repair is correct:

- Check the quality of the operation by measuring the impedance produced by the computer using the diagnostic tool.
- Unlock the airbag computer using the diagnostic tools.
- The warning light should no longer be on.

Note:
During the check with the diagnostic tool, move the lines forwards and backwards slightly.
The resistance measurement should remain stable, if variations in resistance are noticed, start the repair operation again for the defective line.

Refer to the airbag and pretensioner function fault finding procedure for the vehicle concerned.

Apply the recommendations from the generic repair procedure concerning the fitting and protection (see **88A, Wiring, Wiring: Check**).

**6 - Final check.**

After any operation on a wiring harness, check that there are no faults with the diagnostic tools (Clip, EasyClip etc).

Refer to the fault finding procedure for the airbag and pretensioner function concerned.

If a fault is present, pass on the vehicle fault finding to a qualified operator: automotive electrician, technician agent or cotech (level 2 minimum).